DOCUMENT RESUME

ED 136 635 HE 008 625

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TITLE	What Research Says About Learning.
INSTITUTION	Georgia Univ., Athens. Inst. of Higher Education.
PUB DATE	76
NOTE	7p.; Originally presented at a faculty workshop held by Houston Baptist University, September 1, 1976
AVAILABLE FROM	IHE Newsletter, Institute of Higher Education, University of Georgia, Athens, Georgia 30602
EDRS PRICE	MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS	*Academic Achievement; *Accountability; Class Size; College Teachers; Educational Objectives; *Educational Research; *Effective Teaching; Grading; Higher Education; *Learning; Speeches; Student Motivation; Student Participation; Teaching Methods; *Teaching Quality; Testing; Workshops
IDENTIFIERS	*Educational Outcomes

ABSTRACT

This speech addresses the basic but widespread weakness of many efforts in the improvement of college instruction which is believed to be the absence of adequate attention to the theoretical and research foundations of learning and teaching. Some of the current research deals directly with the accountability issue (e.g., criterion-referenced tests, behavioral objectives, and the development of specific instructional systems), but studies about how to produce a lasting result are often neglected. The author reviews the general principles of learning and what the research says about them. He focuses on the significance of such factors as: student ability and motivation; specified conditions or practice and instruction; meaningfulness of learning materials and tasks; degree and quality of motivation; active participation of students and their levels of aspiration; concern for process as well as products of learning; class size; order of presentation; effectiveness of group discussion; student anxiety; and testing and grading methods. (LBH)

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WHAT RESEARCH SAYS ABOUT LEARNING*

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There is a current concern with the improvement of college instruction that has not been evident in the past. Most of this concern takes the form of evaluation and comes under the rubric of accountability—an old concept with a new harshness that has grown out of the public's vague but intense dissatisfaction with education. If the Puritans were the first to establish a legal requirement that children be taught to read, they were not the last to assign broad, extensive responsibilities to the public school and to express high expectations for the performance of teachers.

Yet, the notion that teaching is to be evaluated is an uncomfortable one in higher education and somehow the notion persists that it cannot be evaluated. Unlike the physician whose mistakes are buried, the lawyer whose mistakes go to jail, or the minister whose failures become town gossip, the college instructor is thought to remain unaffected by the mistakes of his profession because the continued ignorance of his students is easily concealed. If exposed, there are always reasons why the student failed to gain the knowledge or skill the instructor presumably tried to instill. It is significant, therefore, that a recent Gallup Poll has shown that the public still regards the college teacher as having high standards. Only physicians and engineers were seen by more people as having high standards.

Neither accountability nor evaluation is the threat that some college professors perceive them to be. Accountability is a much broader concept than evaluation and should imply a larger sense of responsibility on the part of the teaching profession at all levels. Moreover, it should imply an acceptance and a responsiveness by the teaching faculty rather than a superimposition by the public or its representatives. In any event, it should imply a greater concern with specific, identifiable, constructive changes in the lives of students.

It is in the latter sense that converging concepts of accountability may be detected. There has been an obvious concern with: (1) behavioral objectives in instruction with measurable outcomes, (2) criterion-referenced measurement as opposed to the more traditional norm-referenced tests, and (3) a general systems approach to collegiate instruction at the two-year and four-year levels. These suggest, in turn, a pervasive interest in making college instruction both more generally effective and more demonstrable. In other words, there is not only an increasingly serious attempt to improve college instruction but an effort to demonstrate that effectiveness.

Some of the more obvious indications of this thrust are: (1) The Project to Improve College Teaching, sponsored by the American Association of University Professors and the Association of American Colleges—with Kenneth Eble's report, *Professors as Teachers*, (2) the emergence of faculty development as a popular theme—as shown by Jerry Gaff's *Toward Faculty Renewal*, (3) one book published by the American Council on Education in 1967 entitled *Improving College Teaching*—still another in 1970 entitled *Effective College Teaching*, and (4) other serious efforts to deal directly with the subject such as Ohmer Milton's *Alternatives to the Traditional*, Brown and Thornton's *College Teaching: A Systematic Approach* that came out in a second edition in 1971, and Pat Cross's more recent *Accent on Learning*. Add to these the 1400 page *Second Handbook of Research on Teaching* and the 75th yearbook of NSSE, *The Psychology of Teaching Methods*, and you have a better indication of the concern and interest in teaching effectiveness.

Yet, despite the voluminous writings on the subject of teaching improvement, there are limitations to their use in the improvement of instruction as well as serious reservations that they provide a great deal of assistance to either the graduate student in his first teaching assignment or to the new college teacher that has never taught before. Too much of the writing still consists of essays that are prescriptive, inspirational or anecdotal rather than being based on systematic, empirical research into the specific nature of learning and teaching. Neither the psychology of learning nor the numerous studies of teaching methods would seem to be adequate *in and of* themselves. Too frequently they fail to provide a useful guide to the teacher or instructor who is confronted with the problems of teaching a classroom full of students who

*This paper was originally presented at a faculty workshop held by Houston Baptist University on September 1, 1976.

will not or cannot act as they are described in the literature.

In the past, research on college teaching may have been designed to confirm the obvious than to discover new methods or better means. The research question was too often posed in a simplistic nature, asking primarily if students can learn by telephone, television, self-instruction, automated instruction, programmed instruction, etc. The answer in each case has been YES! Students apparently can learn under almost any conditions imposed upon them, when taught by any one of a great diversity of teaching methods, and while suffering from innumerable or sometimes unimaginable handicaps. Otherwise, education as a function of society would have perished years ago.

When not outwardly concerned with simplistic questions as the above, research into college teaching has been concerned with the organizational aspects of education such as class size, course schedules, college calendars, the use of assistants, team teaching, etc. That concern is similar to the dreary debates of another day over: (1) lecture versus group discussion, (2) independent versus guided study, (3) problem-centered versus process-centered approaches, and (4) method versus content or substance in course materials.

More recently, research into college teaching has been subject to certain fads or fashions that may not benefit either instructors or their students. Each of these concerns is correct in shifting more emphasis and interest to the analysis and assessment of output variables in higher education. There is a need to be more concerned with the results or outcomes of education—but there is considerable difficulty in specifying precisely what these outcomes or results should be when we have given too little thought to overall purposes and functions. Some of the more forceful concerns are those dealing directly with the accountability issue. For example:

1. Criterion-referenced tests have great promise but may turn the instructor's attention from important problems of measurement and evaluation and prevent a constructive use of tests and measurement for descriptive and comparative purposes. The thought that each student should be his own yardstick is an attractive one but deceptive in many of its implications.

2. The advocacy of behavioral objectives was a reaction to obvious abuses in education but has been propagated in several quarters as elaborate exercises in trivia.

3. The development of instructional systems could greatly assist college teachers if they were clearly supplementary to the larger efforts of education and did not claim too much in the way of innovation. This is especially true in certain areas where a modular approach to learning is recommended as a major innovation without recognizing that textbooks are divided into chapters for exactly the same reasons.

The criticism here is that in our haste to adopt new instructional strategies, techniques, and procedures we may be subject to a fadism that says, "Take up the new for the sake of newness," or "Innovate for the sake of innovation." In doing so, we capitalize on or reap the benefits of a novelty effect that is better known as the Hawthorne Effect. In our efforts to try new procedures, we may be introducing uncontrolled incentives that produce a spurious, initial effect and tell us nothing about how to produce a lasting result.

The basic, but widespread, weakness of many efforts in the improvement of college instruction is the absence of adequate attention to the theoretical and research foundations of learning and teaching. This is said not to cast a controversy of theory versus technology—or to dig up the perennial controversy between basic and applied research. To the contrary, it is to say that learning as a systematic, constructive change in individual students has not had sufficient impact on the thinking of those who are primarily concerned with the effectiveness of teaching. The situation has been one of a continuing communication gap between learning research on the one hand and college teachers on the other.

There has been a continuing separation of academic departments of psychology in which learning research is a major focus and colleges of education that are charged with the preparation of public school teachers.

During the sixties a strong effort was made by the federal government to bring the advantages of research to bear more directly on the problems of education. Regional laboratories, research and development centers, and other extra-conventional agencies were funded in an effort to shorten the time between discovery or development and application or use. The success of this effort is much in doubt. Many critics are willing to write the effort off as a colossal failure, contending that the funded agencies were captured by the very researchers they were supposed to bypass. As in the past, the funded projects served the needs and interests of individual researchers better than they served the general public or the public school teacher and pupil.

Another criticism of the educational research efforts of the sixties may be that great sums of public funds were consumed in the re-invention of the wheel. Many efforts appear to be independent to the point of isolation; others can only be described as encapsulated. While many of the better efforts did draw upon the seventy years of psychological research that preceded, it is nonetheless true that some efforts were oblivious to both the mistakes and the successes of the past. Given such blissful ignorance, disenchantment on the public's part should have been predictable.

GENERAL PRINCIPLES OF LEARNING

It is not impertinent to ask again: Are there general principles of learning that are applicable to college instruction? Some of us believe there are. We believe that some research findings are consistent enough to warrant their active consideration as guiding principles for the improvement of formal instruction in the college or university. We need not raise the question of whether there are laws of learning or not. In all probability, there are few research findings that would qualify for the status of theoretical or empirical laws as those terms are currently used. What we do have is a number of research conclusions that are tentative enough to use in directing classroom efforts to the improvement of student learning. In brief, there are general aspects, features, or dimensions of learning research that can be applied to college instruction without fear of doing a worse job than most instructors are presently doing.

A word of caution is in order. The acceptance of research findings as general principles for application need not rest on the authority of the principles themselves. They must be related to the specific problems and issues of a particular subject matter field; they are not universal principles to be applied mechanically to all instructional efforts. They must be adapted and modified with intelligence, insight, or some semblance of trial-and-error. From such efforts can be developed specific procedures and techniques that can be geared more closely to the subject matter content of the various fields of instruction. In short, general principles of learning can indeed provide a framework in which the special problems of course instruction can be considered.

The premises upon which this paper is based are not subtle. There is the assumption that college instructors can effect considerable economy of effort if they take the trouble to become better informed about certain principles of learning that are based on systematic research. At least two principles can be stated as a challenge, if not a conclusion:

1. There is no single, best means or procedure by which students learn.
2. There is no single, best method of instruction.

A corollary of these two premises might be that the diversity and complexity of instruction in the college and university permit a variety of teaching styles, instructional methods, or classroom procedures. At the same time, the student may display different learning strategies, study skills, work habits, and other forms of grade-and-credit-getting behavior. College teachers should try to develop an instructional style and procedure that will effectively serve the different efforts of students to learn the particular subject matter the teacher is supposed to teach. Or, in other words, at least three variables will be present in any teaching-learning situation: the teaching approach and cognitive style of the teacher, the personality and learning efforts of the student, and the structure and content of the subject matter that one is teaching and the other is learning.

It does not follow from the above premises that teaching and learning are matters of preference or choice; that given the diversity of students there is nothing the teacher can do to meet their individual differences; that if the student wants to learn or will exercise the right learning strategy, teaching styles do not matter. The challenge of complexity in the teaching-learning process does not permit the instructor to put the burden of effort on either the student or the academic discipline.

If there are college instructors who would reject outright the notion of applying general principles of learning in a classroom, let them at least consider a few working principles of planning, organization, and management that should help students learn more effectively with instruction rather than on their own. Otherwise college instructors may call to question their function as teachers and their entire reason for being.

WHAT THE RESEARCH SAYS

Wilbert McKeachie (1974) has recently published two papers in which he expressed concern that the principles of learning were crumbling. He points out that laws of learning have been derived mostly from studies involving animals and that they may not hold where human students have a greater ability to conceptualize, relate, and remember. Another source of disagreement may be the failure to consider variables that are controlled in psychological experiments but not in the classroom setting.

Two principles believed by McKeachie to hold consistently are identified as: (1) active participation is better than passive learning, and (2) meaningful learning is better than rote learning. He suggests that other principles of learning may not hold in the same manner because learning in the school or college is always an interactive situation in which a developing student engages situational variables, instructional materials, and another individual with resources and capacities designed to help him acquire information, knowledge and skills. The educational outcomes of such complexity, he contends, will depend on the interaction of numerous variables over time.

There are some who believe that McKeachie has thrown in the towel too quickly. The research he cites does not appear more crucial than other studies of longer vintage, but simply more relevant for the kinds of learning that take place in the classroom. There are also reasons to believe that the interaction effects expected between learner traits and teaching methods have not been as easy to ferret out as some researchers thought a mere ten years ago. It might also be that McKeachie ties his understanding of general principles too closely to stimulus-response (S-R) theory, as opposed to cognitive theory.

There is still good reason to believe that the learning of college students can be facilitated by:

1. capacities, motives, and expectations that the student brings to the typical college course as it is conventionally taught.

2. specified conditions of practice and instruction that are relevant to the subject matter. In other words, rote memory may be an effective learning procedure in mastering certain instructional materials such as facts and definitions; no substitute has been found for repetitive practice in the acquisition and development of a skill.

3. the meaningfulness of learning materials and tasks. The manner in which the material is organized, its logical relationship to previous learning, and the student's knowledge of its use are still quite germane. The transfer of learning to other situations would still seem facilitated by an understanding of relationships and the student's actual experience in applying principles of a general nature within a variety of situations. The student's transfer of previous learning can be aided by the similarity of the learning tasks and by the similarity of principles and work methods.

4. the degree and quality of motivation. There may yet be reason to prefer incentives and rewards as a way of encouraging students as opposed to punishment. Another way of saying this is that intrinsic forms of motivation are still to be preferred to extrinsic forms. Such a statement should be tempered, however, with full awareness that the college instructor does not have a great deal of control over intrinsic forms of motivation. What the instructor does have control over are course credit and academic grades.

5. the active participation of students and their level of aspiration. Whatever learning is, it is not the passive recording of data, facts, and figures. What students learn will always depend, to some extent, on their prior experience with success and failure, the goals or objectives students set for themselves, and the tolerance for failure they have been able to develop through experiences with success.

6. a concern for process as well as products of learning. It is not sufficient to focus exclusively on "what the student is to learn" but some consideration and assistance must be given to "how the student will learn." Such guidance, if that term is still permissable, would still seem preferable in the early stages of learning and should be given with intentions to assist the student in developing a suitable learning strategy.

7. knowledge of results that have an optimum degree of specificity and a suitable sense of timing. Information is clearly needed as a form of feedback in cognitive learning and knowledge of results is needed by most students for motivational reasons, if not for learning reinforcement per se. No one should be surprised to find that knowledge of results, when provided too frequently in a meaningless or trivial manner, does not enhance learning. Nor should we be surprised to find many examples of incidental, unrewarded, or unreinforced learning in college students. The question should be: under what conditions can we depend upon incidental or unreinforced learning to offset our failure to provide systematic, meaningful information on the students' academic progress?

OTHER CONDITIONS AND SITUATIONS

Other factors, variables, or conditions affecting learning that can be used for facilitative purposes include class size, tutorial assistance, group discussion, student anxiety, order of presentation, and other forms of feedback and reinforcement. Research on the influence of these factors suggest that learning is affected by a diversity of conditions and situations which should be considered by college instructors and controlled when advantageous.

1. Class size is one of the simplest variables affecting learning and for which consistent findings have been published. Small classes are consistently favored over large classes, but the point of diminishing returns has not been identified. There is no conclusive evidence that the best arrangement is a log, a student, and Mark Hopkins.

2. Order of presentation is another "simple" variable of instruction that would definitely seem to make a difference in learning efficiency. Whether the presentation should be logical—preceding from the general to the specific, or building from the specific to the general—or whether it should be chronological is much debated, but research tends to bring the resolution back to the nature and content of the subject matter. A random order is never advocated, but it could be more appealing to some students than a course that is over-organized and excessively rigid.

3. Some studies have capitalized on the happy circumstance that we often learn by teaching. There is an old adage that we really do not know something until we can teach it to someone else. The story goes that it takes three years at least for the college instructor to master his course content: during the first year neither he nor his students will understand

what he is teaching; in the second year his better students will; in the third year he should. The evidence in favor of using students as either tutors or instructors is not overwhelming, and the better conclusion might be that the use of students in a teaching relationship is expedient in some cases such as developmental or remedial studies, but not one on which a collegiate education should depend.

4. The effectiveness of group discussion seems to depend directly on what the instructor is trying to accomplish. When the purpose of instruction is to transmit factual information, the lecture may be superior. When the purpose is to encourage the development of critical thinking or to foster constructive attitudes, values, or motives, group discussion usually proves more effective. If we ask where the group discussion should be centered, we may infer from the research that if the intent of instruction deals with cognitive skills or the development of attitudes and values, the student is the better focal point; if the intent is to transmit factual information, some benefit appears from time to time from focusing the discussion on the instructor.

5. Student anxiety—either as a function of motivation or as a mental state in its own right—has been investigated by numerous researchers. The gist of this research implies that anxiety is not as consistently disruptive of learning as so often predicted. The influence of anxiety is related to task complexity or the difficulty of the learning materials and appears to have an interactive effect on learning performance.

TESTING AND GRADING

The application of general principles of learning to college instruction is illustrated by needed improvements in the testing and grading practices of college teachers. Perhaps no teaching device supplies the leverage on instructional improvement that tests, examinations, grades, and course credits do. Milton and Edgerly (1976) have demonstrated the need for better skills and practices in classroom tests at the college level and show how a more sophisticated approach to testing and grading could help eliminate many abuses in teaching. There are both sound psychological principles and testing techniques that college instructors should apply.

1. Knowledge of results, feedback, or reinforcement are the obvious uses and applications of classroom or instructor-made tests. Although frequently advocated, the use of classroom tests for such purposes is poorly understood. A sense of gamesmanship still dominates the contruction and use of many course examinations, and far too many, otherwise mature, college instructors perceive their examinations as a battle of wits with their students. There would be less disposition to gamesmanship if college instructors could recognize that in any battle of wits with students, the instructor will eventually lose.

   There are reasons apart from research to make knowledge of results readily available to students for the explicit purpose of encouraging and promoting their learning efforts. A sense of fairness should dictate that students receive information that will properly appraise them of their academic progress. The inconsistencies of research should not be used as an excuse to continue or sustain ineffective teaching. The college teacher who gives an exam, waits three weeks to grade it, then waits another three weeks to return it to students, should not justify that behavior on the failure of research to document the effectiveness of specific, concrete, and immediate feedback on learning performance in a laboratory setting.

2. Tests have motivational properties that should be exploited for teaching and learning purposes. As many college courses are taught, course examinations may be the student's only opportunity for active participation. They may also be the one incentive the instructor can give the student for studying on his own. And it is still conceivable that a good grade on a stiff-but-fair examination constitutes a form of reward that most students will enjoy. Students may understand the motivational properties of tests even when instructors do not. For most students, course examinations represent a necessary means to their grade-and-credit objectives. If the instructors' inspiration and dedication do not suffice, students can still understand the need to prepare for scheduled exams.

3. The meaningfulness of classroom examinations would appear to be especially crucial. A ubiquituous character on college campuses is the disillusioned student who is convinced he was doing fine until he took the final examination. The objective facts need not square with the student's feeling that in some way the test was an unfair measure of what he learned during the course. Also relevant is the student's perceived failure of the test to assist him in learning what he wanted from the course. A frequent criticism heard from students is that the instructor wanted a mechanical playback of trivial facts, pet theories, or favored points-of-view. The objective observer need not agree with the student—but course examinations often demonstrate the instructor's objectives, values, and educational suppositions as nothing else does.

4. Perhaps no principle of learning or testing is more cogent than the premise that the construction and use of course examinations should demonstrate the instructor's concern for the student's learning. If classroom tests could be seen as a formative influence on the student's behavior, it would then be possible to construct tests that would aid or assist students in acquiring the skills, knowledge, and values the course is presumably designed to foster. Instructors who take a screening or filtering posture may be unable to construct and use tests that will facilitate the student's academic progress. Indeed, instructor-made tests may reveal the instructor's self-perceptions as few activities do. Why not construct exams that students will regard as difficult-but-fair and why not use exams in such a manner that students will find them beneficial?

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IHE NEWSLETTER

January, 1977
Athens, Georgia 30602